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### Book Review. Pollution and Policy: A Case Essay on California and Federal Experience with Motor Vehicle Air Pollution, 1940-1975 by J. E. Krier and E. Ursin

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# BOOK REVIEW

POLLUTION AND POLICY: A CASE ESSAY ON CALIFORNIA AND FEDERAL EXPERIENCE WITH MOTOR VEHICLE AIR POLLUTION, 1940-1975. By James E. Krier & Edmund Ursin. Berkeley: University of California Press. 1977. Pp. ix, 401. \$15.95.

In Los Angeles one is dependent upon what one drives. The automobile dominates the form and society of much of urban America, but nowhere is its dominance more pronounced or socially costly than in the Los Angeles region.<sup>1</sup> The Los Angeles Basin rivals the Mediterranean and Dalmatian coasts as one of the world's most hospitable environments, and the high amenities offered by the region's climate promoted its growth.<sup>2</sup> However, meteorological conditions and society's insistence on the freedom of mobility offered by the automobile have combined to degrade the Los Angeles Basin's air.

Although smog is now present in many urban centers, including the currently popular "life style" cities of Denver, San Francisco, and Washington, the phenomenon of persistent air pollution was first perceived as a problem commanding public attention in Los Angeles. From 1940 to 1967, Southern California alone attempted to cope with the relationship between the automobile and air pollution;<sup>3</sup> now the problem is a national one.<sup>4</sup> Thus, the story of how local, state and federal institutions defined California's problem and attempted to solve it is important not only for its own sake, but for the insights the experience provides for the entire country.

Since 1950, the automobile has been identified as the major cause of smog, yet we are still discovering how difficult it is to reduce mobile source pollution. Reduction of mobile source pollution is both a technological and political problem, for hard

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1. For a readable discussion of the impact of the automobile on American life, see E. ROTHSCHILD, *PARADISE LOST: THE DECLINE OF THE AUTO-INDUSTRIAL AGE* (1973).

2. M. SCOTT, *AMERICAN CITY PLANNING SINCE 1890*, at 185 (1969).

3. Muskie, *Role of the Federal Government in Air Pollution Control*, 10 *ARIZ. L. REV.* 17, 18 (1968).

4. The Environmental Protection Agency recently reported that 103 out of 105 urban areas with a population of 200,000 or more violate the photochemical oxidant standard. Only Spokane and Honolulu meet the standard. 5 *HOUS. & DEV. REP.* (BNA) 1008 (1978).

choices must be made between the benefits of cleaner air and the costs of emission reduction. *Pollution and Policy* by James Krier and Edmund Ursin tells the story of Los Angeles's, California's, and finally the federal government's attempt to reduce air pollution by regulating the design, performance, and use of the automobile.

The authors have a good story to tell, and they tell it well. *Pollution and Policy* is a study of the search for a scientific understanding of the causes of smog, the effort to solve the problem by relating emission standards to health impact and then implementing a technological fix, and finally the alarming realization that the key to a rational approach to the problem lies as much in the way we use cars as in the way cars are designed. In short, the story of the attempt to eliminate automobile-caused air pollution is a classic case study of the inability of technology alone to solve environmental problems and of the need to consider abatement strategies involving more fundamental changes in the way we live and organize our economy, which at the same time are related to rational choices about desirable abatement levels. Professors Krier and Ursin have blended together two schools of policy evaluation, the Wisconsin law-in-action tradition and the newer welfare economics analysis of resource allocation, to form a general essay on environmental regulation.

There are many dimensions to the analysis of the institutional responses to air pollution that are relevant to a full understanding of the efficiency of the regulatory process. Political scientists focus primarily on the allocation of regulatory authority among local, state, and federal governments and on the clash of personalities inherent in the evolution of public policy. Sociologists study the relationship between the formulation of public opinion and governmental response. Economists study the least costly method of efficiently allocating the right to use a common property resource. Engineers work on least cost technological solutions, while scientists study the causes and effects of air pollution. All of these aspects are dealt with in the book, often with considerable originality. For example, the authors' treatment of the role of crises on interest group organization and institutional response is particularly insightful.

Some fundamental themes, such as the growing federal control of air pollution regulation between 1960 and 1970, have been described elsewhere, while much of the history of local and state regulation is recounted for the first time. However, the authors' analysis of these important dimensions of the problem is not the most significant achievement of the book. The major contribution of Professors Krier and Ursin to our understanding of envi-

ronmental policy is their analysis of the interplay among inadequate scientific understanding of the cause and effects of air pollution, the resultant difficulties of the legal system when permanent technological solutions are attempted, and the problems resulting from the addition of quickly formulated behavior modification programs to already controversial technology-forcing solutions. Regulatory institutions established to deal with air pollution struggled to formulate a technological solution in the face of two levels of uncertainty. Scientists and engineers could not tell these regulators the rough correlations between emissions and health hazards nor could the engineers guarantee that engine modifications would reduce emission levels to a desired level without more costly side effects.<sup>5</sup> This uncertainty is not troublesome so long as society makes the simplistic assumption that any discharge of residuals into the air equals pollution; however, it becomes critical when a more sophisticated approach to emission reduction is contemplated.

A rational approach to air pollution starts from the assumption that although degradation of the ambient air can be observed by the eye or in the laboratory, its presence alone does not insure that there is a pollution. Ideally, sufficient scientific information would be assembled to delineate the damage caused by air pollution and a cost-benefit analysis would be undertaken to decide how much emission reduction society should demand. If the degradation caused no or little damage—short or long term—there would be no pollution. Lawyers want to know the causal relationship between specific pollutants and quantifiable losses, but, unfortunately, scientific information rarely provides much more than a delineation of the risks of certain types of diseases being exacerbated by certain pollutant levels.

The problem of estimating cause and effect is especially acute with mobile source pollution, and the authors can be faulted for not focusing sufficiently on the technical problems of damage estimation and pollution measurement. The first part of the book is a straightforward description of who did what, when, and how. However, when the authors turn to a general criticism of what they view as irrational federal air pollution policy after setting out the case study, they fail to outline the technical problems which *must be solved before a more rational policy can be developed*. This omission somewhat blurs the focus of the case study's analysis.

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5. See F. GRAD, A. ROSENTHAL, L. ROCKETT, J. FAY, J. HEYWOOD, J. KAIN, G. INGRAM, D. HARRISON, & T. TIETENBERG, *THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT* 31-66 (1976) for a survey of the efforts to predict health and other aspects of air pollution.

In Los Angeles, the adverse impacts of smog have always been assumed. Consequently, the issue in Los Angeles has been what causes smog and how can it be eliminated, not how much should be tolerated. Smog was observed in 1940, but a decade passed before the automobile was identified as its major cause. From 1940 to 1950, the city and state proceeded on the assumption that smog was a traditional, stationary source problem. Not until 1950 did a California Institute of Technology scientist identify the car as the major source of pollution. It took another six or seven years to win acceptance from the scientific community and, more importantly, from the automobile industry, that motor vehicle exhaust did in fact produce smog. Subsequent research has validated the long-standing concern over automobile exhaust emissions, but for somewhat different reasons than were originally assumed. During the time of the study, however, the evidence on automobile exhaust damage was very sketchy.

Important as damage estimation is in theory, it is not a necessary condition for government action. As a recent report has concluded, "[e]nvironmental damage functions are not to be considered as the ultimate tool which will indicate or dictate the policy path to be taken."<sup>6</sup> Of necessity government has the power to set environmental quality standards on the basis of general risk levels.<sup>7</sup> Yet, although emission reduction standards may be established on the basis of available information, the underlying scientific uncertainty constrains society's response to the problem, for it diminishes the legitimacy of the regulatory process created to solve the pollution problem.

Our tradition of due process requires that no sanction be imposed without substantial proof that the action to be sanctioned caused injury to society or an individual. In most cases this is not difficult to establish, although assembling the necessary evidence may be costly. However, in the area of environmental law, it is very difficult to establish that certain activity causes injury. Linkage of specific pollutants to specific property damage or personal injury is difficult. Many of the health hazards are the result of the cumulative impacts of exposure to a pollutant. It is therefore difficult to establish that a regulation mandating emission reduction decreases injury. Thus, due process requirements that the state make a reasonable effort to establish that an activity causes recognized injury, and, perhaps more importantly, that the proposed regulatory solution will at least contribute to reduction

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6. ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, ECONOMIC MEASUREMENT OF ENVIRONMENTAL DAMAGE 14 (1976).

7. *Ethyl Corp. v. EPA*, 541 F.2d 1 (D.C. Cir.), *cert. denied*, 426 U.S. 941 (1976).

of the injury, are often a heavy burden for the legislature and its administrative delegates to meet.

California's early attempts to meet air quality and emissions standards illustrate the constraining impact of these due process considerations. Initially, the acceptability of anti-pollution standards was judged by ordinary due process standards. In Chapter 9, "Dealing with Uncertainty: Setting Pollution Standards," the authors masterfully trace the state's response to uncertainty in its attempts to set fair standards. It was assumed that "in direct applications of technology lay the key to relief,"<sup>8</sup> and that automobile engine modifications should be supported by traditional cause and effect evidence. These assumptions proved too simplistic. In most cases the scientific evidence was not available and there was insufficient awareness that increases in the level of automobile useage tend to cancel technologically produced emission reductions. California's problem was exacerbated by the automobile industry's refusal to make smog control a high research priority and by a well documented conspiracy among the major companies to stifle research which would give one company a competitive advantage over another. Nonetheless, the state forged ahead with efforts to control air pollution through air quality and emission standards.

Beyond the damage estimation problem, automobile emission standards are very difficult to set as it is hard to determine the impact of automobile pollution on ambient air quality. Emissions are a function of the design of the automobile's crankcase, fuel tank and carburetor, and exhaust system. Each component can be modified, but changes in design and engine operation must be based on average performance conditions when in fact engine usage varies considerably during a typical driving trip. More importantly, the level of pollution reduction is a function of engine design, engine operation, and the amount of driving in an area. California struggled with these problems in the 1960s, arbitrarily, but moving cautiously in setting air quality standards and less cautiously in setting emission standards. The state's standards in the end were a difficult to understand compromise:

One cannot help but be struck by the difference of approach as between air quality and emission standards. Regarding the former, the standard-setters tolerated some uncertainty but refused to render judgments in the case of hard uncertainties—in instances, that is, where the data that existed was regarded as insufficient. (The criteria for gauging sufficiency were not expressed.) With respect to emission standards, on the other hand, there appeared to be considerably more tolerance of uncertainty; the standard-setters plunged in

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8. J. KRIER & E. URSIN, *POLLUTION AND POLICY* 95 (1977).

despite severely limited knowledge. That information was at best scant (especially regarding hydrocarbons) seems unquestionable: there were considerable "uncertainties . . . in the measurement of motor vehicle emissions as well as of pollutants from other sources" and there was only "rudimentary" knowledge "regarding the quantitative relationships between photochemical smog effects and the concentrations of the primary smog-producing pollutants." The department's report itself noted a number of strong uncertainties. For example: "The measurement of the exhaust hydrocarbon loss is a very difficult problem. The analytical methods for hydrocarbons have never been considered to be satisfactory enough for standardization." Or, regarding the averaging approach, it was recognized that its reliability depended upon "the distribution of emissions after a control program is implemented." Yet the department recognized that "it is not possible to predict the shape of [the distributional] curve." As a final example, emission standard-setting required "a hypothesis concerning the relationship of smog effects to contaminant concentrations. . . . The evidence currently available is not conclusive and in some instances appears to be contradictory. *Nevertheless, the following equations are proposed as a basis for predicting the effects of exhaust contaminant control.*" The report went on to propose (and employ) the relationships, though it recognized they were "simplifications which do not fully comprehend the variety of photochemical reactions possible." It did so on the basis of "experimental evidence."

Why were the standard-setters willing to confront strong uncertainties (both empirical and theoretical) in the case of emission standards, choosing to rely on "assumptions" and experimental evidence, yet unwilling to proceed in the same manner with respect to air quality standards, insisting instead on "more data on human exposures"? Put more succinctly, why were judgments made on the basis of "present knowledge" in the case of emission standards, but often abjured in the case of quality standards?<sup>9</sup>

Professors Krier and Ursin carry their story forward to the passage of the Clean Air Act of 1970 and the Environmental Protection Agency's (EPA's) abortive implementation of the Act in Southern California. These developments, familiar to most students of environmental law, are only summarized in the book. Those wishing a detailed analysis of the programs and of the complex federalism question subsequently raised by the cases must go elsewhere.<sup>10</sup> The post-1970 developments complete the historical

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9. *Id.* at 128-29 (footnotes omitted).

10. During 1970, the EPA experimented with indirect source controls and automobile use modification programs. The EPA attempted to force states to adopt specific programs as part of state implementation plans. The Clean Air Act Amendments of 1977, 42 U.S.C.A. §§ 7401-7642 (West Pamph. 1977), have limited EPA's authority so that the federalism problems being litigated in cases arising out of

backdrop for an important chapter in which the authors attempt to identify the elements common to environmental regulation and the way in which these elements interact. A theory of the causal sequence of environmental policy is developed through classification of the stages of regulatory policy evolution according to the problem most common to each. As with all theories of policy formulation, the utility lies in the individual insights the study yields rather than in the final generalizations.

Much like Willard Hurst's works, this chapter defies easy generalization; the authors are careful to avoid loose statements and each step in the analysis is tightly drawn with the appropriate qualifications. But, this caveat aside, the basic thesis of the authors is this: Pollution regulation proceeds by a series of least steps. The primary reason for the hesitation is that the initial uncertainty over the causes and effects of air pollution and the effectiveness of emission reduction technologies shifted the burden of justifying air pollution reduction to the state, thus delaying implementation of comprehensive abatement strategies. The automobile industry was able to make a case for no control by forcing the state to justify control measures. The state's inability to make benefit-risk calculations under existing common law and the administrative agencies' constrained standard setting procedures led to regulatory inertia until environmental crises and a resulting process of "exfoliation" (elimination of causes rather than discovery by study) produced knowledge sufficient to allow the regulatory system to go forward.<sup>11</sup>

The final portion of the chapter turns to the question of what lessons the pre-1970 regulatory experience holds for the post-1970 experience. Federal intervention after 1970 was quick and radical compared to the least-step process which preceded it. Between 1973 and 1976, the EPA attempted to impose controls on automobile use which included gas rationing and carpools. The program, as the authors describe in Chapter 13, consisted of ill-thought out strategies of behavior modification which collapsed in the face of public opposition to radical change and to income redistribution aspects of the program perceived to be unfair.

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California and elsewhere have been mooted in some instances. See *Brown v. EPA*, 566 F.2d 665 (9th Cir. 1977). The constitutional problems of the EPA's attempt to mandate state enforcement strategies on top of federal standards stems from *National League of Cities v. Usery*, 426 U.S. 833 (1976), which prohibits the federal government from "displacing the State's freedom to structure integral operations in areas of traditional government functions . . ." *Id.* at 852. See Stewart, *Pyramids of Sacrifice? Problems of Federal Mandating State Implementation of National Environmental Policy*, 86 *YALE L.J.* 1196 (1977).

11. *Id.* at 307.

Krier and Ursin argue that the failure of the EPA's mobile source regulations can be traced to an earlier unwillingness to articulate a rational pollution control policy. Since *Pollution and Policy* is ultimately an argument for an examination of decentralized rather than centralized regulatory strategies, the authors' identification of uniform air quality and emission standards as the critical irrationality in federal policy is logical. Much of the EPA's effort to impose uniform environmental standards supports the argument that we need to experiment with what the authors call "management standards"<sup>12</sup> which eschew exclusive reliance on technological fixes. Thus, in this writer's opinion, the major lesson Krier and Ursin draw from the case study is the right one. Still their explanation of the EPA's failures in terms of uniform standards leaves the reader with a paradox which is presented, but left unexplored. The first part of Chapter 13 seems to suggest that pre-1970 regulatory programs were hampered by inadequate authority. Yet, the post-1970 regulatory programs too were largely failures despite the EPA's having all the authority earlier federal and state agencies lacked. Instead of attempting a full analysis of this paradox, the authors choose to articulate a theory explaining why decentralized solutions should have emerged and then turn to an easy attack on the persistence of uniform standards:

The government initially intervened to allocate the air resource because breakdowns in the system of incentives led to undue pollution. While the resource was sufficiently valuable to justify intervention, its value was small enough (the problem was serious, but not *that* serious) that the gains from an efficient allocation by the government would not be worth the information or administrative costs associated with achieving them. So uniform regulations, which, thanks to their crudeness, entail little in the way of such costs, were used. Over time, however, increasing scarcity (and thus value) of the resource in both absolute and relative terms made efficiency gains more worth-

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12. Krier and Ursin recommend that Congress experiment with a management standards approach which they define as follows:

The concept of management standards is based on technical, economic, and social feasibility. It envisions a series of time-phased steps in each of which there must be achieved substantial percentage reductions in the number of days per year in excess of federally specified uniform ambient *concentration* standards. Ultimately, this number would be reduced to the point where further reductions in the area in question would not be worth the costs of attaining them. Management standards thus aim at long-term (but not uniform) improvements, but they insist in the meantime upon short-term accomplishments that exhaust all feasible controls and that enhance air quality relative to what it was before. The central purpose of the management standards approach is to take into account, in a manageable way, the varying problems and conditions that exist in different areas.

*Id.* at 329-30.

while, while associated administrative costs remained more or less fixed. When value increased sufficiently, one might then expect to see some shift toward pricing systems in order to realize those efficiency gains, because the higher administrative costs associated with such systems would now be worthwhile and also lower than the administrative costs of a regulatory system equal in allocative efficiency. Perhaps this is one underlying reason why, early in the 1970s, one heard not only that the supply of environmental amenities "has fallen far short of the rising effective demand . . . and the supply of certain critical goods, such as pure air and water, has virtually vanished" but observed as well a new interest in pricing. Such speculation is underscored by the fact that mention of increasing concern about environmental resources at times went hand-in-hand with comment upon the new interest.<sup>13</sup>

The thesis that "[t]he failings of present policy to realize announced ends are due in part to the legacy of earlier efforts;" arresting as it is, is ultimately an inadequate explanation for post-1970 EPA policy and its failures. The reasons are two-fold. First, on the methodological level, the final part of the book is too radical a shift from the case study preceding it. The authors turn from a detailed factual problem to broad discussion of air pollution control strategy, only some of which is directly relevant to the problem of mobile source air pollution. Second, the thesis fails to account adequately for the adoption and maintenance of uniform air quality standards; because it does not accord sufficient weight to the impact of scientific uncertainty about the causes and effects of air pollution on standard setting. Krier and Ursin rightly suggest that uniform standards were adopted when the air pollution was serious, but not that serious, and when air resources were valued less highly than they are today. Because the excessive cost of acquiring accurate information to implement a variable standards strategy could not be justified, they surmised that as the resource increased in value and more was known about alternative regulatory strategies, government sought least cost solutions such as decentralized pricing systems. However, they fail to appreciate sufficiently that while the value of the resources was increasing, the information which caused society to place a greater value on clean air resources suggested that there were substantial health and other risks to many emissions. Instead of deciding which risks should be tolerated and which not, society chose a "conservative" strategy of minimizing all risks. This approach is fundamentally inconsistent with efficient implementation strategies, since a risk analysis should question the legitimacy of accepting any pollutant level as acceptable. The net result was that concerns arising from the uncertainty countered any pressure for al-

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13. *Id.* at 304-05.

ternative regulatory approaches. Krier and Ursin discuss the problem of uncertainty only to reject the principle of absolute risk minimization as a justification for the failure to attempt a cost-benefit analysis in setting air quality standards.<sup>14</sup> Their explanation for the failures of post-1970 environmental policy is not wrong, but a more complete analysis of post-1970 developments is needed for the development of a powerful general theory.

The last chapter, "Some Comments on Present Policy," turns from an analysis of the impact of uniform standards to a criticism of their effect, and suggests a decentralized management approach to emission reduction. Krier and Ursin argue that the uniform air quality and vehicle emission standards required by the Clean Air Act make this federal legislation inefficient and unfair. The Act allows California to set higher automobile standards, but in all other respects it preempts state mobile source regulation.<sup>15</sup> Similarly, air quality standards may be raised by the states, but they may not be lowered. Although the 1977 Amendments temper the standards by extending full compliance until 1985, the end result is not changed; federal standards remain high and uniform.<sup>16</sup> It has long been argued that since air quality varies from region to region, uniform standards are per se inefficient because they fail to minimize costs. As the authors point out, "[t]o require adherence to the same stringent standard everywhere will in many areas result in the imposition of control costs that are much larger than the pollution costs avoided."<sup>17</sup> The standard efficiency defenses of uniform standards are: (1) uniform standards are necessary to insure protection of the health of everyone; (2) uniform standards are necessary to protect states desiring clean air; (3) uniform standards are necessary to prevent competition among states in the form of limited rights to pollute; and (4) granted that such standards allocate resources inefficiently, in the long run they are the least costly alternative because they can be implemented more cheaply than other systems which require more information concerning damage levels and the marginal costs of industries. The authors ably refute these defenses. Once one concedes that air quality is a commodity like wheat or corn, these defenses fall. Any regulatory system which fails to take into account the opportunity costs of alternative resource allocations is presumptively inefficient, especially given the rising cost curves for the final in-

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14. *Id.* at 320-21.

15. 42 U.S.C.A. §§ 7507, 7543 (West Pamph. 1977). The 1977 Amendments, however, permit any non-attainment state to adopt California standards. *Id.* § 7507.

16. *Id.* § 7521(a)(3)(A)(ii)(II) (new motor vehicle standards). See also *id.* § 7502(a)(2) (allowing extensions through 1987 for states in non-attainment areas to achieve the federal ambient air quality standards).

17. J. KRIER & E. URSIN, *supra* note 8, at 314.

crements of pollution control elimination. Scholarship published after this book confirms the strength of these arguments with respect to mobile source pollution.<sup>18</sup>

One final consideration remains. If uniform air quality standards cannot be justified on efficiency grounds, can they be justified on fairness grounds? Clean air is a possible candidate for the Rawlsian difference principle.<sup>19</sup> Rawls would allocate basic resources so that the least disadvantaged group in society would readily consent to a different allocation because the minimum allocation is satisfactory. This analysis could quickly lead to high uniform standards. The authors' discussion of this argument is brief, but they do make one telling point. An air pollution policy based on the principle of protecting the health of everyone at equally high levels has severe and perverse redistribution consequences. The cost of high air quality will be borne in part by the poor who already pay a relatively higher proportion of their income for cars, gasoline, and lost employment opportunities. Many people will be forced to purchase health risk minimization insurance at levels higher than they would choose even after reasonable disclosure of the risks of exposure.

My only objection to the Chapter's analysis is that the narrow focus on uniform standards somewhat weakens its applicability to a problem as dynamic as mobile source pollution control. For example, the authors fail to distinguish between uniform air quality standards and uniform mobile emission standards, and argue that both should be non-uniform. They do not, however, dispose of the argument that because of the migratory nature of automobile ownership and the concentrated nature of the automobile industry, engine design and emission standards should be uniform.<sup>20</sup> Of course, it does not follow that air quality standards need to be uniform. Nonetheless, the problems of mobile source pollution control would be roughly the same in many areas of the country regardless of whether air quality standards were uniform or variable. To carry forward the lessons of their California case study, the authors would have had to grapple with many questions such as: by what standards and processes should variable standards be set for different regions, what should be the mix of technology-forcing and automobile use modification strategies to achieve the objectives, and finally, can decentralized control systems such as fuel or driving taxes work as a practical matter? The authors instead sketch a proposal for setting non-uniform standards which require the greatest reductions in the most polluted

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18. L. LAVE & E. SESKIND, *AIR POLLUTION AND HUMAN HEALTH* (1977).

19. J. RAWLS, *A THEORY OF JUSTICE* (1971).

20. See J. KRIER & E. URSIN, *supra* note 8, at 342-44.

areas and urge the consideration of management strategies such as regional gasoline allocations which would limit the total supply.<sup>21</sup> Still as it stands, the Chapter is a good general essay on uniform air quality standards which would be better if it were linked to the problems of the case study.

*Pollution and Policy* is a fine, thoughtful piece of research. Its willingness to question premises which most other writers assume and its wealth of documented information concerning the implementation of an important regulatory program distinguishes it among the environmental law literature. Many may find the theses advanced wrong or inadequate, but all should find them provocative. Further serious scholarship in this area must directly confront *Pollution and Policy* by either refuting its powerful thesis or improving upon its creative analysis.

A. DAN TARLOCK\*

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21. *Id.* at 336-339.

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